

## ABSTRACT OF THE DISCLOSURE

Sub 21 The present invention relates to an optical device for regenerating an optical clock. The optical device includes an optical path provided between an input port to which signal light modulated at a frequency  $f_s$  is supplied and an output port, and an optical loop optically coupled to the optical path. The optical loop includes an optical amplifier for compensating for a loss in the optical loop so that laser oscillation occurs in the optical loop, an adjuster for adjusting the optical path length of the optical loop so that the frequency  $f_s$  becomes equal to an integral multiple of the reciprocal of a recirculation period of the optical loop, and a nonlinear optical medium for mode-locking the laser oscillation according to the signal light. For example, in the nonlinear optical medium, four-wave mixing using the signal light as pump light is generated by third-order nonlinear effects to perform amplitude modulation and regenerate an optical clock at the wavelength of the laser oscillation.